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pH/ ORP Controller

U-PH8-ZXEN2

Preface

Thank you for purchasing pH/ORP online analyzer. Please read this manual carefully before operating and using it correctly to avoid unnecessary losses caused by false operation.

Note

- Modification of this manual's contents will not be notified as a result of some factors, such as function upgrading.
- We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us.
- This product is forbidden to use in explosion-proof occasions.

Version
U-PH8-ZXEN2

Safety Precautions

In order to use this product safely, be sure to follow the safety precautions described.

About this manual

- Please submit this manual to the operator for reading.
- Please read the operation manual carefully before applying the instrument. On the precondition of full understanding.
- This manual only describes the functions of the product. The company does not guarantee that the product will be suitable for a particular use by the user.

Precautions for protection, safety and modification of this product

- To ensure safe use of this product and the systems it controls, Please read carefully the operation manual and understand the correct application methods before putting into operation, to avoid unnecessary losses due to operation mistakes. If the instrument is operated in other ways not described in the manual, the protections that the instrument give may be destroyed, and the failures and accidents incurred due to violation of precautions shall not be borne by our company.
- When installing lightning protection devices for this product and its control system, or designing and installing separate safety protection circuits for this product and its control system, it needs to be implemented by other devices.
- If you need to replace parts of the product, please use the model specifications specified by the company.
- This product is not intended for use in systems that are directly related to personal safety.Such as nuclear power equipment, equipment using radioactivity, railway systems, aviation equipment, marine equipment, aviation equipment and medical equipment.If applied, it is the responsibility of the user to use additional equipment or systems to ensure personal safety.
- Do not modify this product.

- The following safety signs are used in this manual:

Hazard, if not taken with appropriate precautions, will result in serious personal injury, product damage or major property damage.

Warning:Pay special attention to the important information linked to product or particular part in the operation manual.

- Confirm if the supply voltage is in consistent with the rated voltage before operation.
- Do not use the instrument in a flammable and combustible or steam area.
- To prevent from electric shock, operation mistake, a good grounding protection must be made.
- Thunder prevention engineering facilities must be well managed: the shared grounding network shall be grounded at is-electric level, shielded, wires shall be located rationally, SPD surge protector shall be applied properly.
- Some inner parts may carry high voltage. Do not open the square panel in the front except our company personnel or maintenance personnel acknowledged by our company, to avoid electric shock.
- Cut off electric powers before making any checks, to avoid electric shock.
- Check the condition of the terminal screws regularly. If it is loose, please tighten it before use.
- It is not allowed to disassemble, process, modify or repair the product without authorization, otherwise it may cause abnormal operation, electric shock or fire accident.
- Wipe the product with a dry cotton cloth. Do not use alcohol, benzine or other organic solvents. Prevent all kinds of liquid from splashing on the

product. If the product falls into the water, please cut off the power immediately, otherwise there will be leakage, electric shock or even a fire accident.

- Please check the grounding protection status regularly. Do not operate if you think that the protection measures such as grounding protection and fuses are not perfect.
- Ventilation holes on the product housing must be kept clear to avoid malfunctions due to high temperatures, abnormal operation, shortened life and fire.
- Please strictly follow the instructions in this manual, otherwise the product's protective device may be damaged.

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- Do not use the instrument if it is found damaged or deformed at opening of package.
- Prevent dust, wire end, iron fines or other objects from entering the instrument during installation, otherwise, it will cause abnormal movement or failure.
- During operation, to modify configuration, signal output, startup, stop, operation safety shall be fully considered. Operation mistakes may lead to failure and even destruction of the instrument and controlled equipment.
- Each part of the instrument has a certain lifetime, which must be maintained and repaired on a regular basis for long-time use.
- The product shall be scrapped as industrial wastes, to prevent environment pollution.
- When not using this product, be sure to turn off the power switch.
- If you find smoke from the product, smell odor, abnormal noise, etc., please turn off the power switch immediately and contact the company in time.

Disclaimer

- The company does not make any guarantees for the terms outside the scope of this product warranty.
- This company is not responsible for damage to the instrument or loss of parts or unpredictable damage caused directly or indirectly by improper operation of the user.

Package contents

Number	Name	Quantity	Remarks
1	pH/ORP online analyzer	1	
2	Manual	1	
3	Certificate	1	

After opening the box, please confirm the package contents before starting the operation.If you find that the model and quantity are incorrect or there is physical damage in appearance, please contact us.

Contents

Chapter 1 Introduction

pH/ORP controller is one of the intelligent on-line chemical analyzers, which is widely used in the continuous monitoring on pH value or OPR value and temperature of thermal power, chemical engineering and fertilizer, metallurgy, environment protection, pharmacy, biochemistry, food and tap water as well as other solution.

Technical Parameters

Screen size		4.3 inch		
Installation		Panel mounted		
Dimension		Overall dimension:144mm * 144mm * 115mm Cutout dimension:138mm * 138mm		
Panel thickness		1.0 ~ 5.0mm		
Weight		0.68Kg		
Ingress protection		IP65		
Measured variables		pH/ORP/Temp		
Measurement range	pH	-2.00 ~ 16.00pH		
	ORP	-1999 ~ 1999mV		
	Temp	-10.0 ~ 130.0℃		
Accuracy	pH	pH sensor	±0.02pH	
		Antimony pH sensor	±0.2pH	
	ORP	±0.1%FS		
	Temp	NTC10K	-10 ~ 60℃	±0.3℃
			60 ~ 130℃	±2.0℃
		PT1000/PT100	±0.3℃	
Temperature compensation		NTC10K/PT1000（PT100 optional）		
		Temperature compensation：manual/automatic		
Operating temperature		0 ~ 60℃		

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Storage conditions	-20 ~ 70℃
Relative humidity	（10 ~ 85）%RH（No condensation）
Input resistance	≥ 10^12Ω
Language	Chinese/English
Analog output	1 output（2 output optional）4-20 mA, maximum loop is 750Ω,±0.2%FS
Communication protocol	MODBUS-RTU RS485
Alarm relay	2 channel, Normally open 245VAC 5A Max.
Automatic Cleaning	Manually clean, set cleaning interval
Record	100 sets, recording interval can be set through configuration, the recording method is FIFO.
Power supply	100 ~ 240VAC，5W Max，50/60Hz

Chapter 2 Installation

2.1 Instrument installation

The installation site and method of the instrument are explained, the part shall be carefully read during the installation.

Notes for installation

- The instrument is panel mounted.
- Please install it at the place with good ventilation in order to prevent the internal temperature of the instrument from rising.
- Horizontal installation shall be realized as possible

The following places shall be avoided during the installation

- Do not expose direct to sunlight and near heaters.
- The location where the environment temperature exceeds 60℃ during the work.
- The location where the environment humidity exceeds 85% during the work.
- The vicinity of the electromagnetic occurring sources.
- The sites with strong mechanical vibration.
- The site where the temperature is changed a lot and the moisture condensation is easily formed.
- Places with lots of lampblack, steam, moisture, dust and corrosive gas.

Installation

A 138mm*138mm installation hole is opened at the instrument cabinet or installation panel (The thickness of the mounting panel is 1.0 ~ 5.0mm).
Insert the controller into the square mounting hole and fasten the holder.

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138mm

138mm

Cut-out Size

Fixed

200mm

90mm

200mm

Panel Mounted

Installation Panel Dimension
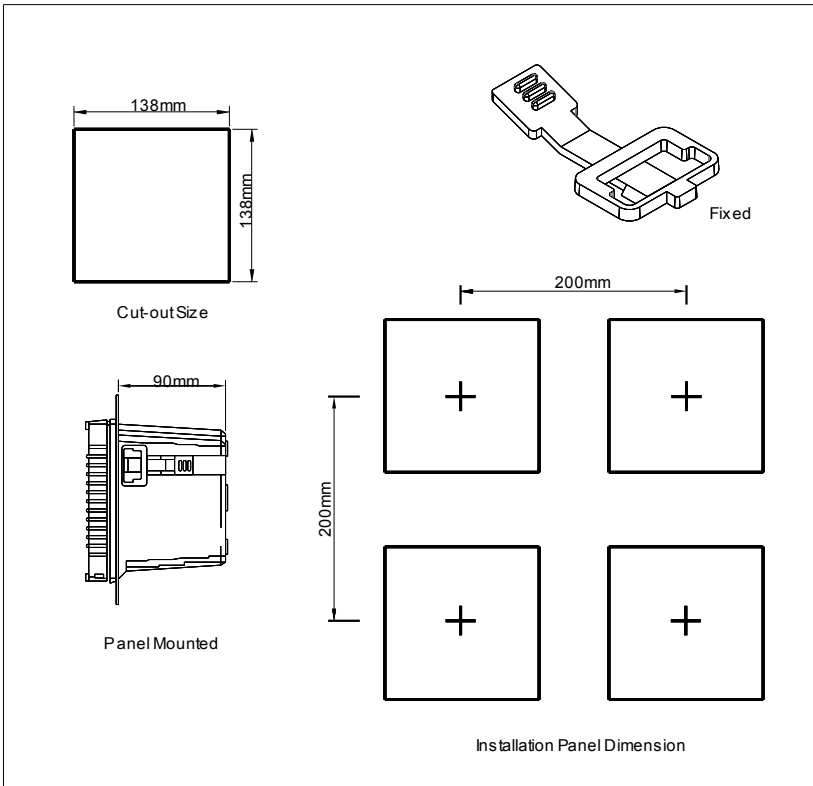
2.2 Electrode installation

② Flange mounted at the top

Top installation

④

⑥

Side wall installation

①

15°

Flow-through installation

● The interface must be in 15°oblique angle, or it will affect the normal test and use of the electrode. We won't be responsible for any results due to this.
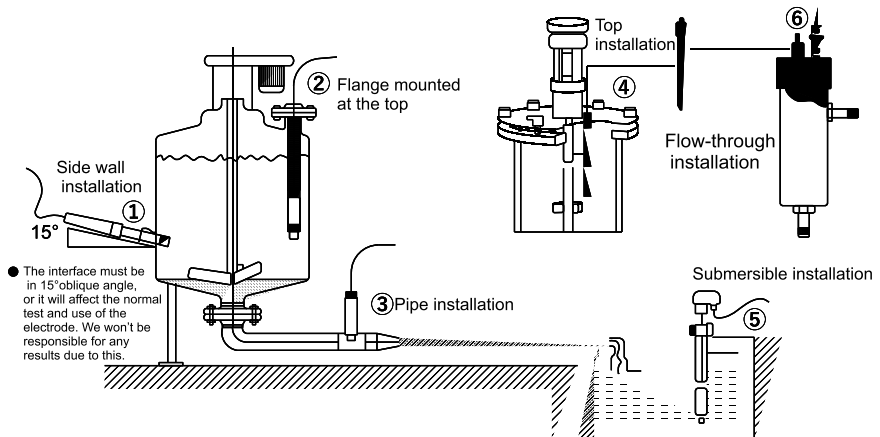
③Pipe installation

Submersible installation

⑤
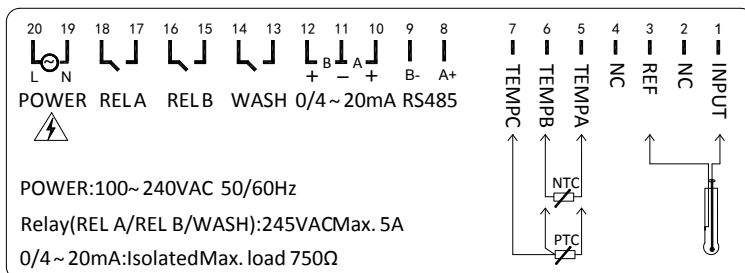
Figure 1 Sketch diagram of the common installation method

①Side wall installation

②Flange mounted at the top

③Pipe installation

④Top installation

⑤Submersible installation

⑥Flow-through installation

The interface must be in 15 oblique angle, or it will affect the normal test
and use of the electrode.   We won't be responsible for any results
due to this.

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### 2.3 Product wiring

Wiring diagram

POWER:100~240VAC 50/60Hz

Relay(REL A/REL B/WASH):245VACMax. 5A

0/4~20mA:IsolatedMax. load 750Ω

Definition of the port

1、INPUT：pH/ORP/ Antimony electrode measuring terminal

2、NC：undefined

3、REF：pH/ORP/ Antimony electrode reference

4、NC：undefined

5、TEMPA：Temperature measurement terminal A

6、TEMPB：Temperature measurement terminal B

7、TEMPC：Temperature measurement terminal C

8、RS485 A+：RS485 communication interface A +

9、RS485 B-：RS485 communication interface B －

10、0/4 ~ 20mA A+：A Current output+

11、0/4 ~ 20mA A/B-：A/B Current output -

12、0/4 ~ 20mA B+：B Current output+

13/14、WASH：Cleaning device relay

15/16、REL B：Alarm relay B

17/18、REL A：Alarm relay A

19、POWER N：AC220V neutral wire

20、POWER L：AC220V live wire

Electrical wiring reference diagram
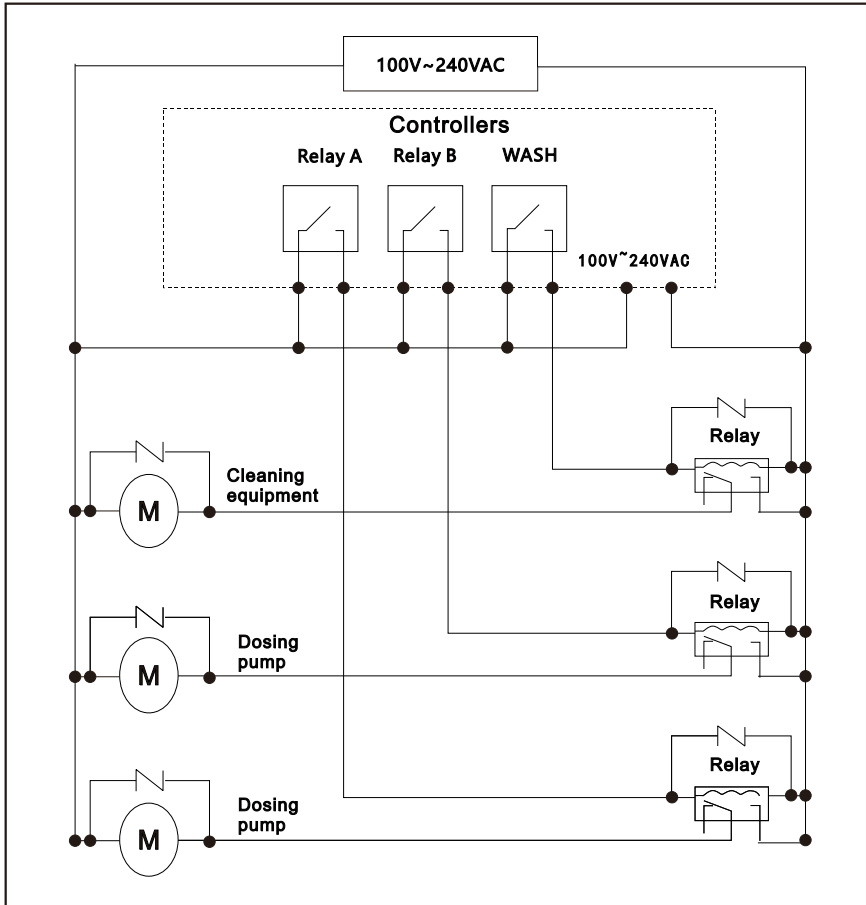
Chapter 3 Display Panel

3.1 Display Panel
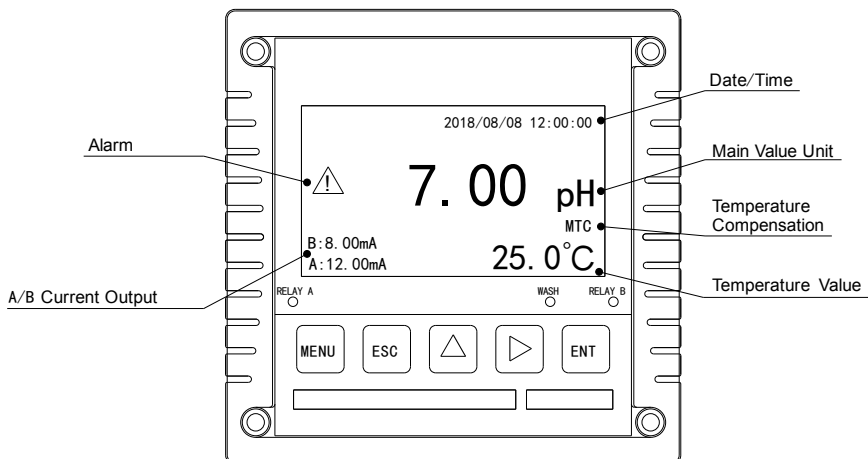
3.2 Navigation keys

Sign	Button name	Function description
MENU	MENU	Under "Monitoring page" - Enter the MENU Under "Menu page" - Exit the MENU
ESC	EXIT	Under "Monitoring page" - Alarm view Under "Menu page" - Return to the previous page Under "Calibration page" - Skip this item
▲	UP	Under "menu page" - Select the related menu Modify the values in the configuration state
▶	RIGHT	Make a recurrent selection of digit of parameters modify the original indication value
ENT	ENTER	Under "Menu page" - Enter the sub-menu or confirm

3.3 LED Indicator

WASH: Cleaning control relay status indicator

RELAY A: Alarm control relay A status indicator

RELAY B: Alarm control relay B status indicator

3.4 Default setting

Password：0000

Mode：pH

Calibration type: 3-point calibration, 4.00 / 6.86 / 9.18

Temperature type: MTC 25.0 ℃

Relay A: ON, Hi, high point 11.00pH, return difference 1.00pH

Relay B: ON, Lo, low point 3.00pH, return difference 1.00pH

Cleaning relay: OFF

Communication: baud rate 9600, no parity, 1 stop bit, floating point format 4321, address 1

Current output A: pH, 4 ~ 20mA, -2.00 ~ 16.00pH

Current output B: T, 4 ~ 20mA, -10.0 ~ 130.0 ℃

Date and time: 0: 0: 0: 0 on January 1, 2018

Filter coefficient: 0

Backlight brightness: 20

Recording interval: 15 minutes

Chapter 4 System menu

4.1 Mode

pH mode

Through mode option, pH mode can be selected. The main display numbers and units of the measurement display interface will be switched to pH value and its unit pH, and other parameters in the configuration settings will also be switched to parameters in pH mode.

ORP mode

Through mode option, ORP mode can be selected. The main display number and unit of the measurement display interface will be switched to the ORP value and its unit mV, and other parameters in the configuration settings will also be switched to the parameters in ORP mode.

Antimony mode

Through mode option, antimony mode can be selected, which only support the measurement of antimony electrode. The main display numbers and units of the measurement display interface will be switched to the antimony electrode measurement value and its unit pH. Other parameters in the configuration settings will also be switched to the parameter in antimony mode.

4.2 Calibration

pH calibration

When it is pH mode, the pH calibration function can be used. The calibration points can be selected from 1 to 3 points. The specific calibration steps are as follows:

- pH 1-point calibration: Select 1 point for calibration point, press [ENT] to enter the pH 1-point calibration interface, change the standard value on the interface to the theoretical value of the current pH standard buffer

- solution, and then put the pH electrode into the pH standard buffer solution. After the actual measurement value is stable, press [ENT] to confirm the calibration and return to the menu interface.

- pH 2-point calibration: Select 2 points for calibration point and press [ENT] to enter the calibration point selection interface. You can choose from 6 types of calibration point combinations: 4.00 / 6.86, 6.86 / 9.18, 4.00 / 9.18, 4.01 / 7.00, 7.00 / 10.01, 4.01 / 10.01. Press [ENT] to confirm the selected calibration point and enter the first point interface of pH 2-point calibration. Put the pH electrode into the first pH standard buffer solution. After the actual measurement value is stable, press [ENT] to confirm the calibration and enter the second point interface of pH 2-point calibration. Put the pH electrode into the second pH standard buffer solution. After the actual measurement value is stable, press [ENT] to confirm the calibration and return to the menu interface.

- pH 3-point calibration: Select 3 points for calibration point and press [ENT] to enter the calibration point selection interface. You can choose from two types of calibration point combinations: 4.00 / 6.86 / 9.18, 4.01 / 7.00 / 10.01. Press [ENT] to confirm the selected calibration point and enter the first point interface of pH 3-point calibration. Put the pH electrode into the first pH standard buffer solution. After the actual measurement value is stable, press the [ENT] to confirm the calibration and enter the second point interface of pH 3-point calibration. Put the pH electrode into the second pH standard buffer solution. After the actual measurement value is stable, press the [ENT] to confirm the calibration and enter the third point interface of pH 3-point calibration. After the actual measurement value is stable, press [ENT] to confirm the calibration and return to the menu interface.

ORP calibration

When it is ORP mode, the ORP calibration function can be used. The calibration points can be selected from 1 to 2 points. The specific calibration steps are as follows:

- ORP 1-point calibration: Select 1 point for calibration point, press [ENT] to enter the ORP 1-point calibration interface, change the standard value on the interface to the theoretical value of the current ORP standard buffer solution, and then put the ORP electrode into the ORP standard buffer solution. After the actual measurement value is stable, press [ENT] to confirm the calibration and return to the menu interface.

- ORP 2 point calibration: Select 2 points for calibration point, press [ENT] to enter the first point interface of the ORP 2 point calibration, change the standard value on the interface to the current theoretical value of the first ORP standard buffer solution, and then put the ORP electrode into the first ORP standard buffer solution. After the actual measurement value is stable, press [ENT] to confirm the calibration and enter the second point interface of ORP 2-point calibration. Change the standard value on the interface to the current theoretical value of the second ORP standard buffer solution, and then put the ORP electrode into the second ORP standard buffer solution. After the actual measurement value is stable, press the [ENT] key to confirm the calibration and return to the menu interface.

Antimony calibration

When it is antimony mode, antimony calibration function can be used. The calibration point can be selected from 1 to 3 points. The specific calibration steps are the same as those of pH calibration. An antimony electrode is required for measurement.

4.3 Temperature

MTC mode

Through temperature option, MTC mode can be selected. Under this mode, temperature value of the solution to be measured can be manually set.

NTC mode

Through temperature option, NTC mode can be selected. Under this mode, temperature value of the test solution measured by the temperature probe for the NTC 10K electrode can automatically be read, and current measured temperature can be calibrated. The temperature calibration range is -10.0 ~ 10.0 ℃.

PTC mode

Through temperature option, PTC mode can be selected. Under this mode, temperature value of the test solution measured by the temperature probe for the PT1000 electrode (customizable) can automatically be read, and current measured temperature can be calibrated. The temperature calibration range is -10.0 ~ 10.0 ℃.

4.4 Relay A

Entering the relay A option, the user can choose to turn this function on or off. If choosing to turn it on, the user can choose the high point (Hi) or low point (Lo) alarm, and then enter the set point and return difference value, press [ENT] to complete the setting and return to the menu interface.

4.5 Relay B

Entering the relay B option, the user can choose to turn this function on or off. If choosing to turn it on, the user can choose the high point (Hi) or low point (Lo) alarm, and then enter the set point and return difference value, press [ENT] to complete the setting and return to the menu interface.

4.6 Automatic Cleaning

Entering the cleaning option, the user can choose to turn this function on or off. If choosing to turn it on, enter the cleaning interval and cleaning duration (the cleaning duration must be less than the time interval), press [ENT] to complete the setting and return to the menu.

4.7 Communication

Enter the communication option. Since this machine uses Modbus-RTU communication protocol, baud rate (2400, 4800, 9600, 19200, 38400, 57600, 115200), check bit (no parity, odd parity, even parity), stop bit (1 bit, 2 bit), floating point format (4321, 3412, 2143, 1234) and local address (1 ~ 254) can be set. For Modbus-RTU communication protocol, please refer to Chapter 5 Communication. (Some models do not support this option.)

4.8 Current output A

Entering current output A option, the user can choose the transmission of pH / ORP / antimony electrode or temperature Temp, and then select the output current from 0 ~ 20mA or 4 ~ 20mA, set its corresponding pH / ORP / antimony electrode or temperature Temp value at 0 / 4mA and 20mA. Press [ENT] to complete the setting and return to the menu.

4.9 Current output B

Entering the current output B option, the user can choose the transmission of pH / ORP / antimony electrode or temperature Temp, and then choose the output current of 0 ~ 20mA or 4 ~ 20mA, set its corresponding pH / ORP / antimony electrode or temperature Temp value at 0/4mA and 20mA.Press [ENT] to complete the setting and return to the menu. (Some models do not support this option.)

4.10 Clock

Enter the clock option, set the displayed year, month, day, hour, minute, and second, and press [ENT] to complete the setting and return to the menu interface. Note: This controller can maintain time update even when there is no power supply. If time cannot be updated, the battery may be dead. Please replace the 3V CR2032 button battery inside the controller.

4.11 Filter

Entering the filter option, the user can set the filter coefficient according to his own needs from the range of 0 ~ 9, where 0 is the most sensitive measurement display value, and 9 is the most stable measurement display value. Press [ENT] to complete the setting and return to the menu interface.

4.12 Backlight

Entering the backlight option, the user can set the backlight brightness according to his own needs, ranging from 1 to 25, where 1 is the darkest and 25 is the brightest. Press [ENT] to complete the setting and return to the menu interface.

4.13 Password

Enter the password option, enter the original password, press [ENT] to enter the new password interface and modify the password. Press [ENT] to complete the setting and return to the menu interface.
Notes: The factory preset password is 0000. If you forget the password, please contact our company for after-sale services.

4.14 language

CH/EN

Entering the language option, the user can choose Chinese or English (currently support only 2 languages, other languages can be customized), and press [ENT] to complete the setting and return to the menu interface.

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4.15 Recording

History data

The history data can be viewed through the recording option. The recording method is first-in-first-out. Currently, only 100 sets of short-term data storage are supported (customization is available if more recording sets are needed.) Press [ENT] to complete the setting and return to the menu interface.

Parameter setting

Data recording interval setting is available, from the range of 00:00:01 ~ 23:59:59. Press [ENT] to complete the setting and return to the menu interface.

4.16 Factory setting

Some parameters of the controller can be restored to the factory preset values through the factory setting option (the user is generally not recommended to use this function). Press [ENT] to complete the setting and return to the menu interface.

Chapter 5 Communication

5.1 Communication connection

The RS485 communication interface of this controller has the characteristics of isolation protection. It can be connected by ordinary twisted pairs (twisted shielded wires).The wiring diagram is shown in Figure 2:
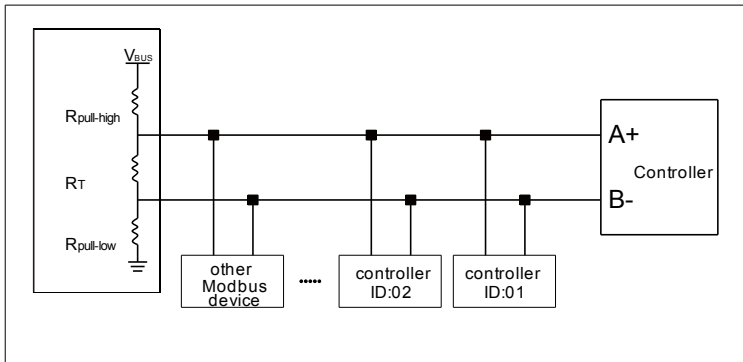

Figure 2 RS485 Communication wiring diagram

Notes

1. A 120Ω terminating resistance R_T can be connected in parallel at both ends of the transmission lines A + and B- of the terminal equipment to effectively reduce or eliminate signal transmission.

2. Without repeaters, the maximum number of devices. The maximum transmission distance is 1200m. For long-distance transmission, it is recommended to use a cable designed for RS485 transmission.

3. During communication, the baud rate, parity bit and stop bit of all devices on the bus should be consistent, and the device addresses must not be the same, so as to avoid communication abnormality caused by bus conflicts.

4. The duration time for the host computer to wait for a response from the slave computer generally needs to be greater than 0.5 seconds.

5.2 Modbus communication protocol

Function code 03 (0x03): read one or more registers

Inquiry frame

Name	Device address	Function code	Initial address	Number of data	CRC
Data	Addr	0x03	M	N	CRC16
Length (bytes)	1	1	2	2	2

Response frame (normal response)

Name	Device address	Function code	Return byte	Return data	CRC
Data	Addr	0x03	N * 2	Data	CRC16
Length (bytes)	1	1	1	N * 2	2

Special Notes

Inquiry frame: the number of data indicates the number of read registers, the data range (1 ~ 50)

Response frame: the high byte of each register comes first, and the low byte comes afterwards. (floating point data is arranged in the order of floating-point format)

Example

Read pH value (example measurement mode is pH)

Inquiry: 01 03 00 01 00 02 95 CB

Response: 01 03 04 40 E0 00 00 EE 05

It shows that the pH value was read successfully. The current value is 7.00pH (floating point format 4321).

Function code 06 (0x06): write a single register

Inquiry frame

Name	Device address	Function code	Initial address	Data value	CRC
Data	Addr	0x06	M	Data	CRC16
Length (bytes)	1	1	2	2	2

Response frame (normal response)

Name	Device address	Function code	Initial address	Data value	CRC
Data	Addr	0x06	M	Data	CRC16
Length (bytes)	1	1	2	2	2

Special Note

Inquiry frame: This command can only write the value of a single register. High byte of each register comes first, low byte comes afterwards.

Response frame: If successful, the command sent by the computer is returned as it was, otherwise the response is abnormal.

Example

Change the measurement mode to ORP

Inquiry: 01 06 00 25 00 01 59 C1

Response: 01 06 00 25 00 01 59 C1

It indicates that the measurement mode was successfully changed to ORP.

Function code 16 (0x10): write multiple registers

Inquiry frame

Name	Device address	Function code	Initial address	Number of data	Number of bytes	Data value	CRC
Data	Addr	0x10	M	N	N*2	Data	CRC 16
Length (bytes)	1	1	2	2	1	N * 2	2

Response frame (normal response)

Name	Device address	Function code	Initial address	Number of data	CRC
Data	Addr	0x10	M	N	CRC16
Length (bytes)	1	1	2	2	2

Special Notes

Inquiry frame: the number of data indicates the number of registers written. Each register is represented by 2 bytes, with the high byte coming first, and the low byte afterwards. When the written data represents a floating point number, the two registers together represent a floating point number. The byte order of the 4-byte data follows the setting of the floating point format.

Response frame: if the command sent by the computer is successfully returned as it was except for the number of bytes and data value, otherwise the response is abnormal.

Example

Change the measurement mode to ORP and temperature mode to NTC

Inquiry: 01 10 00 25 00 02 04 00 01 00 01 A1 88

Response: 01 10 00 25 00 02 50 03

It indicates that the measurement mode was successfully changed to ORP and the temperature mode was changed to NTC

Modbus register address correspondence table

Address	Access authority	Data type	Data size	Function code	Data name	Description
0x0001	Read only	Float	4	0x03	pH /ORP / Antimony electrode measurement value	
0x0003	Read only	Float	4	0x03	Temperature measurement	
Reserved						
0x0020	read and write	uShort	2	0x03 /0x06 /0x10	Device address	1 ~ 254
0x0021	read and write	uShort	2	0x03 /0x06 /0x10	Serial port baud rate	1：2400 2：4800 3：9600 4：19200 5：38400 6：57600 7：115200
0x0022	read and write	uShort	2	0x03 /0x06 /0x10	Communication parity bit	0:No parity 1:odd parity 2:Even parity
0x0023	read and write	uShort	2	0x03 /0x06 /0x10	Communication stop bit	1: 1 digit 2: 2 digits
0x0024	read and write	uShort	2	0x03 /0x06 /0x10	Communication floating point format	1：1234 2：2143 3：3412 4：4321
0x0025	read and write	uShort	2	0x03 /0x06 /0x10	Mode	0：pH 1：ORP 2：antimony (antimony

						electrode)
0x0026	read and write	uShort	2	0x03 /0x06 /0x10	Temperature mode	0：MTC
						1：NTC
						2：PTC
0x0027	read and write	uShort	2	0x03 /0x06 /0x10	Filter coefficient	0～9
Reserved						

Chapter 6 Maintenance

1. The storage of pH glass electrode, short-term: it's stored at the buffered solution of pH=4; long-term: it's stored at the buffered solution of pH=7.

2. The washing glass electrode physical bulbs of the pH glass electrode possibly lengthen the response time of the electrode due to contamination. CCl4 or soap solution can be used to wipe the dirt, then it can be continued to use after being soaked in the distilled water for a whole night. It can be soaked for 10~20 minutes by 5% HF solution when the contamination is serious, then immediately use water to wash clean, finally It's used after being soaked in the 0.1mol/L HCl solution for a whole night.

3. Treatment of glass electrode aging: the aging of glass electrode is related to the progressive change of the substratum structure. The response of the old electrode is slow,   the membrane resistance is high, and the slope is low. The external substratum is etched by HF, which can usually improve the electrode performance. If the internal and external substratum can be regularly cleaned by this method, the service life of the electrode is almost unlimited.

4. The best storage solution for the storage Ag-AgCl electrode of the reference electrode is saturation KCl solution, the high concentration KCl solution can prevent the AgCl from being deposited at the solution border and keep the solution border at the working condition. This method can also be used for the storage of combined electrode.

5. The problems of regenerated reference electrode   are mostly caused by the blocking of solution border, which can be solved by the following methods:

    (1) Solution border is soaked: the mixed liquid of 10% saturation KCl solution and 90% distilled water is heated to 60~70℃, the electrode is soaked for about 5cm, it's soaked for 20 minutes to 1 hour. This method can eliminate the crystal at the electrode terminal.

    (2) Soaked by ammonia: the stronger NH3.H20 can be used to eliminate when the solution border is blocked by AgCl. The specific method is to

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wash clean the electrode, then it's soaked for 10~20 minutes in NH3.H20 after the solution is evacuated, but the NH3.H20 can't enter the internal part of the electrode. The electrode is picked out and washed clean by distilled water, which can be continued to use by adding internal solution.

(3) Vacuum method: use soft tube to cover the solution border of the reference electrode, use pump to suck the internal solution until penetrate the solution border, and then the mechanical blocking materials are removed.

(4) Solution border is boiled: the solution border of Ag-AgCl reference electrode is soaked in boiled water for 10~20 seconds. Notice that the electrode shall be cooled to room temperature before the next boiling.

(5) The mechanical method of abrasive paper can be adopted to eliminate the blocking when the above mentioned methods are invalid, this method possibly blocks the ground sand grains into the solution border and cause permanent blocking.

Chapter 7 Troubleshooting

The user must read this manual carefully before installation and use, and should operate the instrument correctly according to the content of this manual to confirm whether the installation and use environment meets the requirements. The following table shows the possible failures of the pH / ORP controller. Users can troubleshoot the problems according to the symptoms.

Common malfunctions	Method of exclusion
Signal data is displayed incorrectly or is displayed "——"	Wiring error: please check if the input signal cable is connected correctly
	Over range: The measured value is out of range.
No display at the controller？	Check if the power supply is correctly connected.
Fluctuation of the displayed value?	Check if there are frequency converters and other interference equipment at the surrounding environment, notice to keep away from this interference equipment or adopt shield measures.
The pH instrument can't be calibrated？	The standard solution preparation is not correct or the electrode is damaged.
The test of standard solution pH4.00, pH6.86 and pH9.18 calibration is not correct?	If the standard solution is contaminated, exchange the standard solution for calibration again.
The response of the figure is slow?	The electrode physical bulb is covered by dirt, the response will become slow, please clean according to the corresponding methods based on the types of the pollutants, it's normal phenomenon if it's slow in winter.